ARTICLE 34 AMENDMENTS

TO THE ENGLISH TRANSLATION

AMENTDMENT

(Amendment based on PCT Article 34)

4. Subject of Amendment

Specification and Claims

5. Contents of Amendment

(1) The following descriptions are inserted before the description of "Brief description of the drawings". Accordingly, page 5 of the Japanese specification [corresponding to page 8 of the English translation] is substituted by substituting sheets: pages 5, 5/1, and 5/2 [corresponding to page 8, 8/1, 8/2, and 8/3 of the English translation].

"The third aspect of the present invention is a vibration-proof apparatus comprising: a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion; a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion; an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion; a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body; a sub-liquid chamber communicating with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber; a movable

partition portion which forms a part of the partition of the pressure-receiving liquid chamber, and which is movably supported in a direction in which the internal volume of the pressure-receiving liquid chamber expands or contracts; an equilibrium chamber which is disposed adjacent to the pressure-receiving liquid chamber, through the movable partition chamber; a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion, wherein a plurality of the switching valves is serially connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion, switching of communication of the equilibrium chamber with one of the negative pressure supply source and the atmospheric pressure supply source is successively carried out by each switching valve, whereby negative pressure and atmospheric pressure are introduced alternately into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion.

The fourth aspect of the present invention is a vibration-proof apparatus comprising: a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion; a second mounting member which is connected to the other of the vibration-generating portion and the

vibration-receiving portion; an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion; a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body; a sub-liquid chamber which communicates with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber; a movable partition portion which forms a part of the partition of the sub-liquid chamber, and which is movably supported in a direction in which the internal volume of the sub-liquid chamber expands or contracts; an equilibrium chamber which is disposed adjacent to the sub-liquid chamber, through the movable partition chamber; a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber in synchronous with the inputted vibration from the vibration-generating portion, wherein a plurality of the switching valves is serially connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion, switching of communication of the equilibrium chamber with one of the negative pressure supply source and the atmospheric pressure supply source is

successively carried out by each switching valve, whereby negative pressure and atmospheric pressure are introduced alternately into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion."

(2) Claims 5 and 6 are added. As a result, Claims on page 17 and page 18 of the Japanese specification [corresponding to pages 30 through 33 of the English translation] are substituted by substituting sheets: pages 17, 18, 18/1 [corresponding to pages 30 through 33, 33/1, 33/2, and 33/3 of the English translation].

6. List of Accompanying Document

(1) pages 5, 5/1, and 5/2 in the Japanese specification [corresponding to pages 8, 8/1, 8/2, and 8/3 of the English translation]

(2) pages 17, 18 and 18/1 pages in the Japanese specification [corresponding to pages 30 through 33, 33/1, 33/2, and 33/3 of the English translation]

source, and a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion, wherein a plurality of the switching valves is connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion.

In accordance with the vibration-proof apparatus according to the second aspect of the present invention, operations and effects which are fundamentally the same as those in the vibration-proof apparatus according to the first aspect of the present invention can be obtained. However, since the movable partition portion forms a part of the partition of the sub-liquid chamber, and the equilibrium chamber is disposed adjacent to the sub-liquid chamber through the movable partition portion, if the cross-section and the length of the limiting path connecting the pressure-receiving liquid chamber and the sub-liquid chamber are determined (tuned) in accordance with the vibration frequency which is desired to be absorbed particularly effectively, the change of pressure in the sub-liquid chamber due to the alternate introduction of negative pressure and atmospheric pressure into the equilibrium chamber can be amplified by means of a resonance effect of the liquid flowing through the limiting path, and transmitted. Consequently, the inputted vibration having the specified frequency can be absorbed and damped particularly effectively.

The third aspect of the present invention is a vibration-proof apparatus

comprising: a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion; a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion; an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion; a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body; a sub-liquid chamber communicating with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber; a movable partition portion which forms a part of the partition of the pressure-receiving liquid chamber, and which is movably supported in a direction in which the internal volume of the pressure-receiving liquid chamber expands or contracts; an equilibrium chamber which is disposed adjacent to the pressure-receiving liquid chamber, through the movable partition chamber; a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted

vibration from the vibration-generating portion, wherein a plurality of the switching valves is serially connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion, switching of communication of the equilibrium chamber with one of the negative pressure supply source and the atmospheric pressure supply source is successively carried out by each switching valve, whereby negative pressure and atmospheric pressure are introduced alternately into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion.

The fourth aspect of the present invention is a vibration-proof apparatus comprising: a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion; a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion; an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion; a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body; a sub-liquid chamber which communicates with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber; a movable partition portion which forms a part of the partition of the sub-liquid chamber, and

which is movably supported in a direction in which the internal volume of the sub-liquid chamber expands or contracts; an equilibrium chamber which is disposed adjacent to the sub-liquid chamber, through the movable partition chamber; a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber in synchronous with the inputted vibration from the vibration-generating portion, wherein a plurality of the switching valves is serially connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion, switching of communication of the equilibrium chamber with one of the negative pressure supply source and the atmospheric pressure supply source is successively carried out by each switching valve, whereby negative pressure and atmospheric pressure are introduced alternately into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion.

Brief Description of the Drawings

WHAT IS CLAIMED IS:

1. A vibration-proof apparatus comprising:

a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion;

a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion;

an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion;

a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body;

a sub-liquid chamber which communicates with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber;

a movable partition portion which forms a part of the partition of the pressure-receiving liquid chamber, and which is movably supported in a direction in which the internal volume of the pressure-receiving liquid chamber expands or contracts;

an equilibrium chamber which is disposed adjacent to the pressure-receiving liquid chamber, through the movable partition chamber;

a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and

a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion, wherein

a plurality of the switching valves is connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion.

2. A vibration-proof apparatus comprising:

a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion;

a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion;

an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion;

a pressure-receiving liquid chamber whose partition is partially formed by

the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body;

a sub-liquid chamber which communicates with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber;

a movable partition portion which forms a part of a partition of the sub-liquid chamber, and which is movably supported in a direction in which the internal volume of the sub-liquid chamber expands or contracts;

an equilibrium chamber which is disposed adjacent to the sub-liquid chamber, through the movable partition chamber;

a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and

a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion, wherein

a plurality of the switching valves is connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion.

3. The vibration-proof apparatus according to 1 or 2, characterized in that the plurality of the switching valves are connected serially, through pipes, to the equilibrium chamber.

4. The vibration-proof apparatus according to 1 or 2, characterized in that, when N switching valves are connected to the equilibrium chamber and F is the frequency of the inputted vibration from the vibration-generating portion, each of the plurality of the switching valves is successively and selectively operated substantially at the cycle of N/F.

5 (added). A vibration-proof apparatus comprising:

a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion;

a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion;

an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion;

a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body;

a sub-liquid chamber communicating with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber;

a movable partition portion which forms a part of the partition of the pressure-receiving liquid chamber, and which is movably supported in a direction in which the internal volume of the pressure-receiving liquid chamber expands or contracts;

an equilibrium chamber which is disposed adjacent to the pressure-receiving liquid chamber, through the movable partition chamber;

a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and

a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion, wherein

a plurality of the switching valves is serially connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion, switching of communication of the equilibrium chamber with one of the negative

pressure supply source and the atmospheric pressure supply source is successively carried out by each switching valve, whereby negative pressure and atmospheric pressure are introduced alternately into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion.

6 (added). A vibration-proof apparatus comprising:

a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion;

a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion;

an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion;

a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body;

a sub-liquid chamber which communicates with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber;

a movable partition portion which forms a part of the partition of the sub-liquid chamber, and which is movably supported in a direction in which the internal volume of the sub-liquid chamber expands or contracts;

an equilibrium chamber which is disposed adjacent to the sub-liquid chamber, through the movable partition chamber;

a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and

a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber in synchronous with the inputted vibration from the vibration-generating portion, wherein

a plurality of the switching valves is serially connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion, switching of communication of the equilibrium chamber with one of the negative pressure supply source and the atmospheric pressure supply source is successively carried out by each switching valve, whereby negative pressure and atmospheric pressure are introduced alternately into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion.